



Enabling Nuclear Innovation: Strategies for Advanced Reactor Licensing

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DOE-NRC Advanced Non-LWR Workshop

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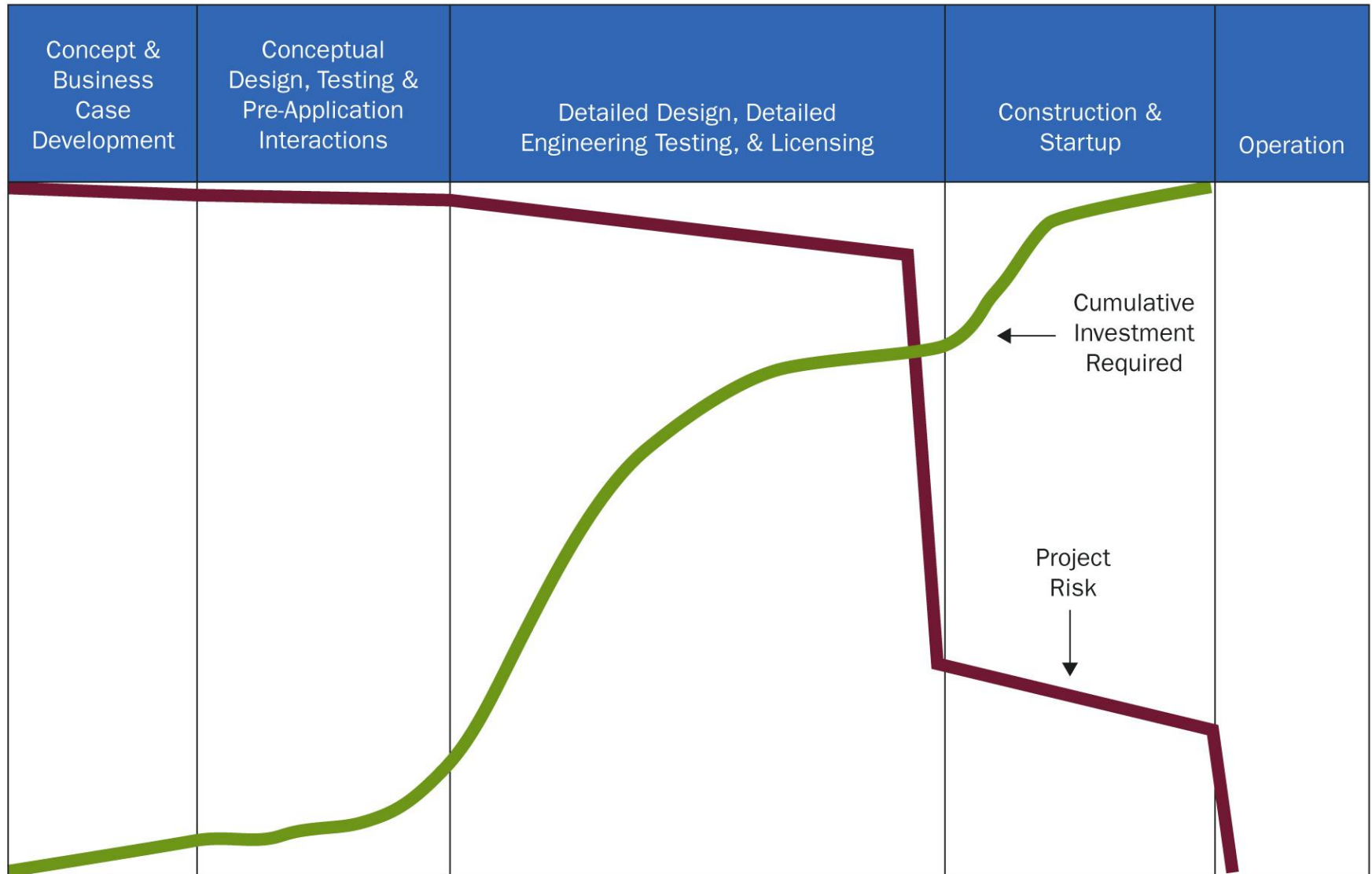
NIA Strategic Priorities

- **Top priorities:**
 - A staged and more technology-inclusive licensing process
 - A test bed & demonstration platform where nuclear innovators in the private sector can demonstrate advanced technologies
- **Next tier priorities:**
 - Cooperation to provide for international commercial testing, demonstration, and deployment of advanced technologies.
 - Financial support for early stage technology development and early commercial deployment.

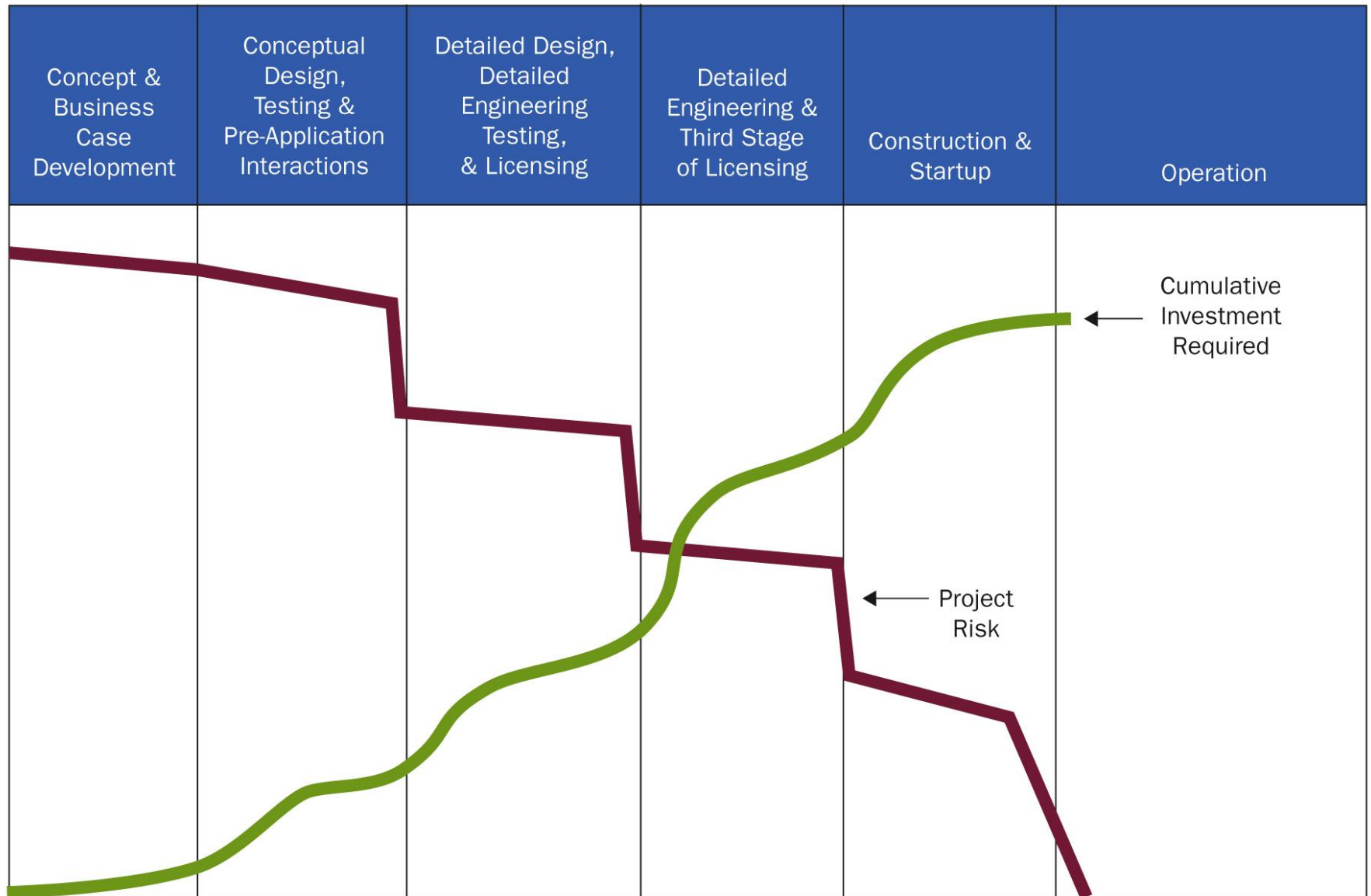
Key Challenges to Commercialization

- Regulations designed for light water technologies do not easily fit advanced reactors, requiring major revisions to requirements, exemptions, and high costs and long time periods interacting with the regulator.
- The licensing process is “all or nothing,” requiring a major investment of time and money, without interim steps that provide concrete feedback.
- Some innovators need to build a prototype or demonstration reactor.

Current Project Risk/Investment Profile Relative to Licensing



Desirable Project Risk/Investment Profile Relative to Licensing



Advanced Reactor Licensing Initiative

April 2016



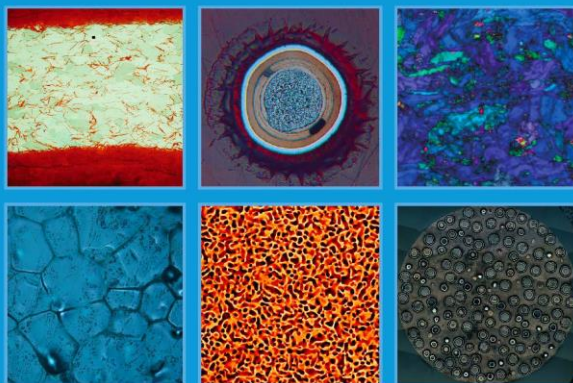
Goal

- A process that
 - Incorporates discrete stages;
 - Is more predictable, efficient, and cost-effective for advanced reactors;
 - Is more technology-inclusive; and
 - Maximizes the use of current regulations while recognizing limitations of LWR-centric features.

Report Issued April 2016

Download the Report at:
www.nuclearinnovationalliance.org

Enabling Nuclear Innovation
**Strategies for Advanced
Reactor Licensing**



A Report by the
Nuclear Innovation Alliance

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Report Recommendations

Regulatory Recommendations

Staged Licensing

- A licensing project plan, along with topical reports and the standard design approval can be used to define stages.
- Staff guidance and policy decisions will be needed to implement this (a rulemaking is not required).

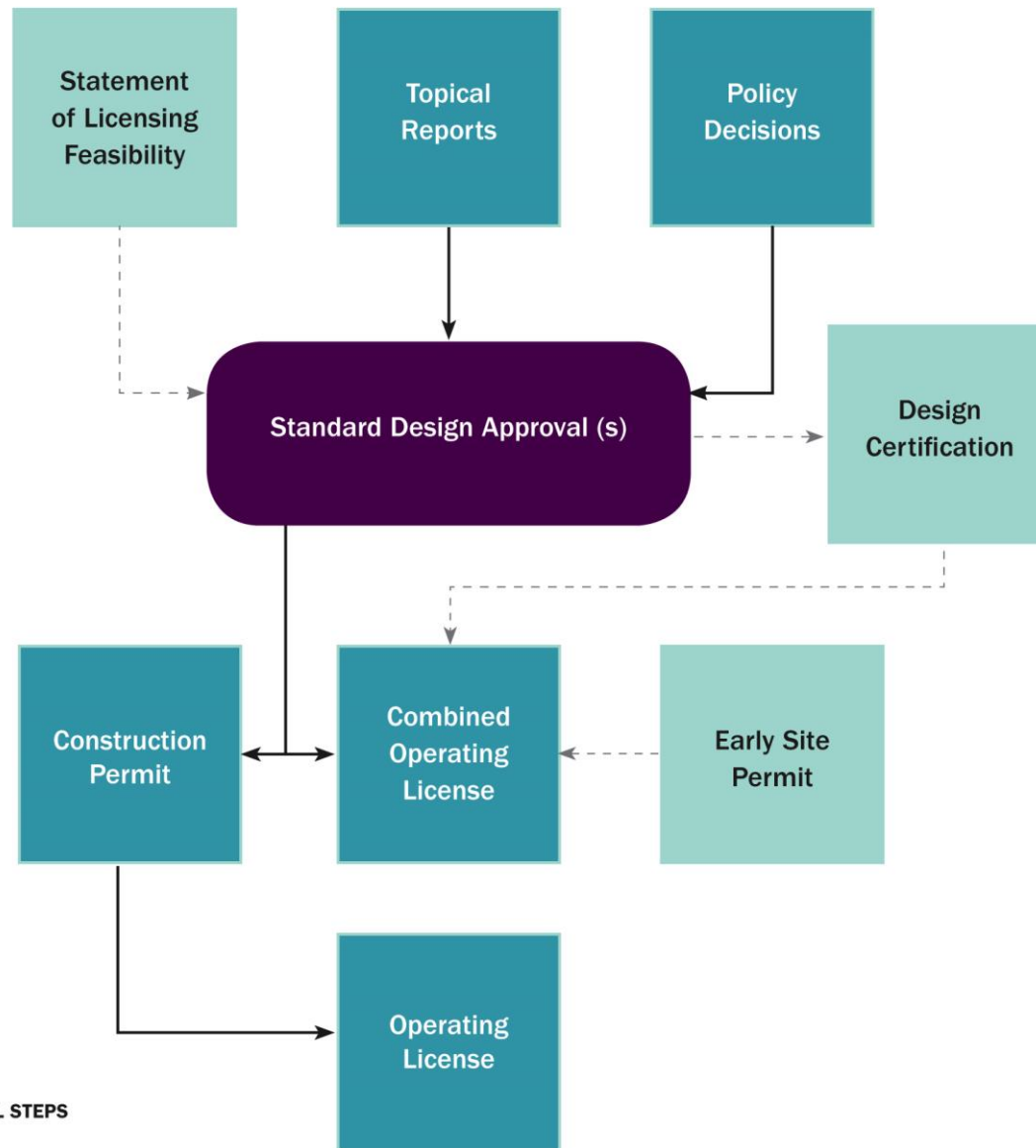
Licensing Project Plan

- Industry and NRC Practices have led to inefficiencies
 - Late identification of the need for guidance
 - Limited front-end planning of regulatory engagement
 - Delayed licensing submittals
 - Lack of management engagement
- A Licensing Project Plan will help to mitigate those issues
 - Defines working relationship between NRC and applicant, including communication protocol
 - Defines review components for each stage of licensing (project schedules, testing requirements, deliverables, and NRC review budgets)
 - Forms the basis for an agreed application schedule between NRC and developer and provides a mechanism for accountability

Statement of Licensing Feasibility

- Provides early-stage feedback on whether a preliminary reactor design is consistent with current NRC regulations. (Pre-licensing)
- Does not represent a commitment by NRC to issue a license
- It would offer important benefits:
 - it would standardize a review phase that, because of its limited cost and duration, could be used by stakeholders to compare available design options;
 - it would provide early feedback to the applicant, allowing timely alterations in approach to better meet regulatory expectations
- Based on CNSC Vendor Design Review Phase 1
- Staff guidance and policy decisions will be needed to implement this

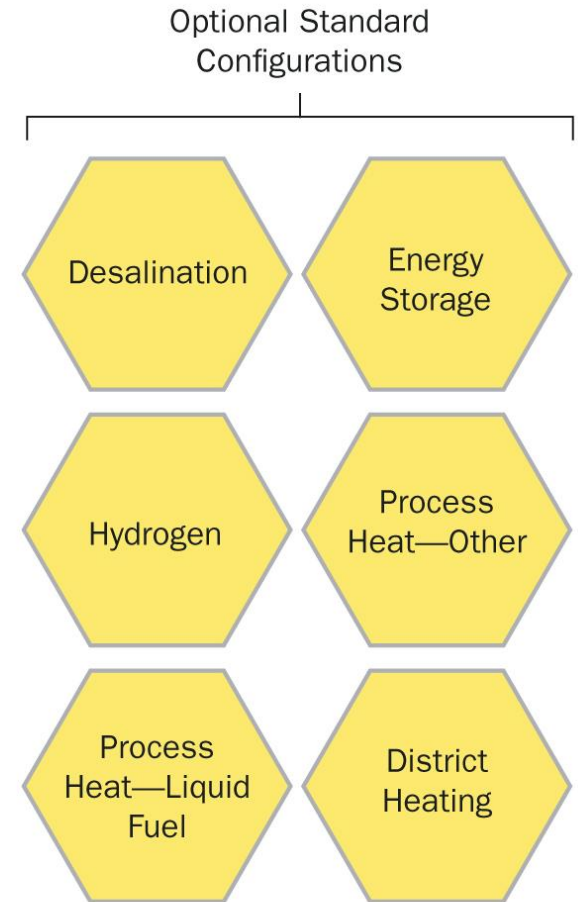
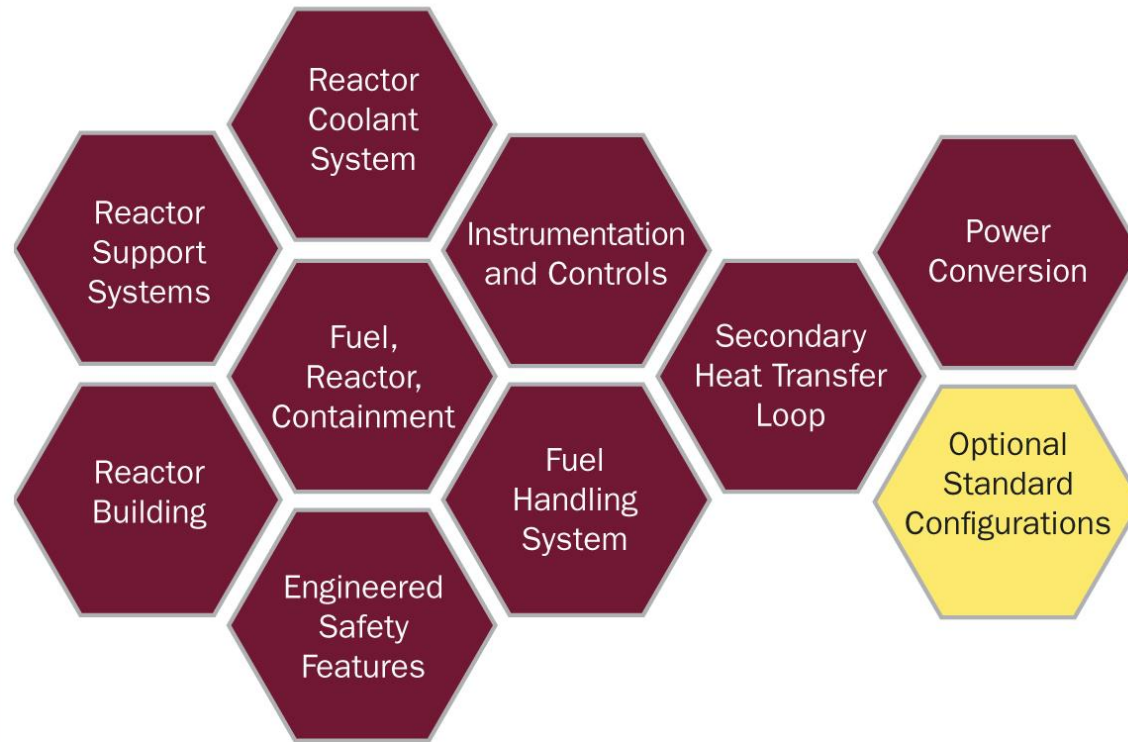
LICENSING PROJECT PLAN



Elements of Staged Licensing

Flexibility of the Standard Design Approval

This figure is meant to be representative. It isn't exhaustive and is not expected to represent all possible or acceptable SDA topics.



Each of the Standard Design Approvals must satisfy the interfacing boundary conditions for safety and licensing.



Possible SDA scope; multiple topics could be combined.



Once SDAs are in place, a variety of end-use applications are possible, provided they meet appropriate boundary conditions.

Risk-Informed Performance Based Licensing

- Immediate Term:
 - Address Advanced Reactor Policy Issues
 - Revise LWR-centric requirements, while increasing the use of risk-informed and performance based techniques and guidance for advanced reactors
 - Continue to move forward with the DOE/NRC Advanced Reactor Licensing Initiative
- Medium Term
 - Develop and implement a technology-inclusive licensing and regulatory framework for advanced reactors

Preparing and Clarifying an Advanced Reactor Demonstration Licensing Process

- NRC and DOE, in cooperation with stakeholders should clarify terminology and resolve discrepancies and gaps in statutes, regulations, and practice
- NRC should develop guidelines for advanced reactor demonstrations nearing readiness for review

Other Recommendations

Policy Recommendations

- Revise the NRC's budget structure so that licensees and applicants reimburse it for activities related to their regulation, with Congress funding other agency-related activities
- Appropriate funds for the NRC to prepare for advanced reactor licensing
- Continue funding to DOE for competitively awarded grants for early efforts to license advanced reactors

Industry Recommendations

- Industry has an important role to play as a constructive participant in all of the above recommendations, but also has primary responsibility for several actions:
 - Coordinate and deliver a consistent message about technology-inclusive advanced reactor priorities.
 - Inform the NRC as early as possible of prospective applicants' intent to request review.
 - Take a more active role in communicating with the NRC, DOE and other stakeholders on the challenges and opportunities associated with various advanced reactor designs.
 - Pursue the development of codes, standards and conventions for advanced nuclear power, working with the appropriate research and standards organizations.

We intend these recommendations to serve as a foundation for appropriate deliberation and, soon after, decisive action to improve the regulatory pathway for advanced nuclear energy technologies. This is critically important work that will enable society to capture the immense future benefits of advanced nuclear power.

Legislative Progress

- **S. 2795, Nuclear Energy Innovation and Modernization Act**
- **H.R. 4979, Advanced Nuclear Technology Development Act of 2016**
- Both exempt advanced reactor regulatory infrastructure development from fee recovery (appropriations will be needed)
- Both have provisions for staged licensing and technology inclusive or technology neutral regulations
- Both seek to ensure that the NRC has access to adequate technical expertise and modeling and simulation for advanced technologies
- Both are bipartisan. Co-sponsorship: H.R. 4979 has 11R's 5D's. S. 2795 has 5R's and 2D's.
- Both have been ordered to be reported out of committee

Thank you

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